

## THE BATS (MAMMALIA: CHIROPTERA) OF THE ARGENTINE CHACO

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### ABSTRACT

An annotated checklist of the species of bats occurring in the Argentine Chaco is provided, as well as an analysis of their distribution in three clearly differentiated areas: the Western, the Eastern, and the Central Chaco. The Western and Eastern Chaco have the largest number of species with 31 each, while the Central Chaco has only 14 species. This difference in richness is related to contact of the Chaco with humid and transitional habitats adjacent to the western and eastern subregions. We also give a comparison with the bat faunas of the Chaco of Paraguay and Bolivia, as well as general comments about taxonomy, feeding guilds, abundance, and reproduction.

### RESUMEN

En este trabajo se ofrece la lista de especies que habitan el Chaco argentino, analizada desde un punto de vista biogeográfico, en el contexto de tres regiones claramente definidas: Occidental, Central y Oriental. Asimismo, se presenta una comparación con las áreas chaqueñas de Paraguay y Bolivia. Actualmente el Chaco argentino contiene 43 especies de murciélagos, lo que representa un 86% de las especies que habitan todo el ecosistema. Las porciones oriental y occidental sopportan cada una un total de 31 especies mientras que solo 14 se encuentran en la región central. Este patrón de riqueza de especies tiene estrecha relación con los bosques húmedos del este y del oeste. Se mencionan, además, los gremios alimenticios y la abundancia relativa de todas las especies y comentarios taxonómicos y reproductivos de la mayoría de ellas.

### INTRODUCTION

Myers and Wetzel (1983) recently clarified knowledge of the taxonomy and distribution of Chacoan bats. Information about the species from the Argentine Chaco is lacking, consequently preventing a better analysis of the taxonomy and biogeography of bats in the whole region.

Barquez (1987) summarized data concerning the identity and distribution of Argentine bats, and noted that the Argentine Chaco has the highest number of species compared to any other phytogeographical province in the country. Nonetheless, the Chaco is a poorly sampled region, with most of the sample localities occurring close to the Yungas forests in the northwest and the Paranáense Phytogeographic Province in the northeastern part of the country.

More extensive sampling of localities from throughout the Argentine Chaco, together with a review of the published records and examination of specimens in

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systematic collections, has permitted us to make a more detailed zoogeographic analysis of Chacoan bats.

In this paper, we present an annotated checklist of distributional records for all known species of bats occurring in the Argentine Chaco, and provide a discussion of the zoogeographic relationships between different areas within the Chaco.

### MATERIALS AND METHODS

This study was based on literature records, on specimens deposited in systematic collections, and on specimens obtained during field trips in the Chaco. Specimens examined are deposited in the following collections: AMNH, American Museum of Natural History, New York; BMNH, Natural History Museum, London; CEM, Colección Elio Massoia y Familia, Buenos Aires; CM, Carnegie Museum of Natural History, Pittsburgh; CML, Colección Mamíferos Lillo, Universidad Nacional de Tucumán; FCM, Facultad de Ciencias Exactas y Naturales, Universidad Nacional de Buenos Aires; IADIZA, Instituto Argentino de Investigaciones de Zonas Aridas, Mendoza; MACN, Museo Argentino de Ciencias Naturales, Buenos Aires; MFA, Museo Florentino Ameghino, Santa Fé; MLP, Museo de La Plata, Buenos Aires; MSB, Museum of Southwestern Biology, University of New Mexico, Albuquerque; OU, Oklahoma Museum of Natural History, University of Oklahoma, Norman; ROM, Royal Ontario Museum, Toronto; SSC, The Vertebrate Museum, Shippensburg University of Pennsylvania, Shippensburg; TCWC, Texas Cooperative Wildlife Collection, Texas A & M University, College Station; TTU, The Museum, Texas Tech University, Lubbock; USNM, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

One hundred forty-four localities are included on the map (Fig. 1), whereas 12 others could not be located. All localities are listed alphabetically in Appendix 1, with Province and Department indicated parenthetically. Geographic coordinates are given for localities that were sufficiently documented on specimen tags, in the literature, or from other sources.

The Argentine Chacoan Phytogeographic Province is an extensive sedimentary plain extending over northern and central Argentina (Cabrera, 1976). The Chaco is a mosaic of thorn-scrub woodlands, grasslands, cacti, palms, and terrestrial bromeliads. The organization of this mosaic is determined mainly by complex interactions between climatic factors (i.e., precipitation) and soil conditions. Reddish alluvial soils dominate in the Chaco. These are heavy textured and poor in organic matter. Surface pH values range from 6.8 to 7.8 in an east-west gradient where salinity is high. Soils are deep with abundant primary minerals and soluble salts. Extensive salt pans ("Salinas") occurring in areas of poor drainage are a distinctive feature of the western Chacoan landscape. As a result of an east-west gradient of decreasing precipitation, the Chaco can be divided into three subregions: the Western Chaco, the Central or Semihumid Chaco, and the Eastern or Humid Chaco (Bucher, 1982; Cabrera and Willink, 1973; Morello and Adámoli, 1968). In this study, Chaco Serrano is included in the western subregion, whereas the Chaco Austral is included as part of the eastern subregion. The vegetation of the Chaco has been well studied and thoroughly reviewed (Adámoli et al., 1972; FAO/PNUMA, 1985; Hueck, 1966; Morello and Adámoli, 1974; Ragonese and Castiglioni, 1970). We present here more detailed descriptions of the three Chacoan subregions.

#### *The Western Chaco*

The Western Chaco occurs in the semiarid extreme of the precipitation gradient. The annual rainfall of the Western Chaco shows marked fluctuations. On the eastern side, where it makes contact with the central subregion, the average annual rainfall is 700 mm. On the western margin, annual rainfall varies between 450 and 550 mm. The Chaco Serrano has an annual precipitation of 700 to 800 mm. Absolute summer temperatures rise above 48.9°C, whereas absolute winter temperatures reach -8°C (Prohaska, 1959).

Vegetation in the Western Chaco is characteristically tall, xerophylous open forest (between 12 to 18 m), with dominant trees such as *Schinopsis quebracho-colorado*, *Aspidosperma quebracho-blanco*, *Caesalpinia parviflora*, *Cercidium australe*, *Bulnesia sarmientoi*, and *Chorisia insignis*. Other important vegetational elements are cacti, such as *Opuntia quimilo* and *Cereus coryne*, grasses (*Setaria*, *Chloris* and *Trichloris*), and terrestrial bromeliads (*Bromelia hieronymi* and *Deinecanthon urbanianum*), and in "salares," *Allenrolfea patagonica* and *Heterostrachis ritteriana* are dominant. In the Chaco Serrano trees reach 8 to 10 m in height. Dominant tree species include *Schinopsis haenkeana*, *Fagara coco*, *Acacia caven*, and *Jodina rombifolia*. Shrubs such as *Atamisquea emarginata* are distributed in a patchy fashion among grasses and cacti. Montane grasslands of *Festuca* and *Stipa* are

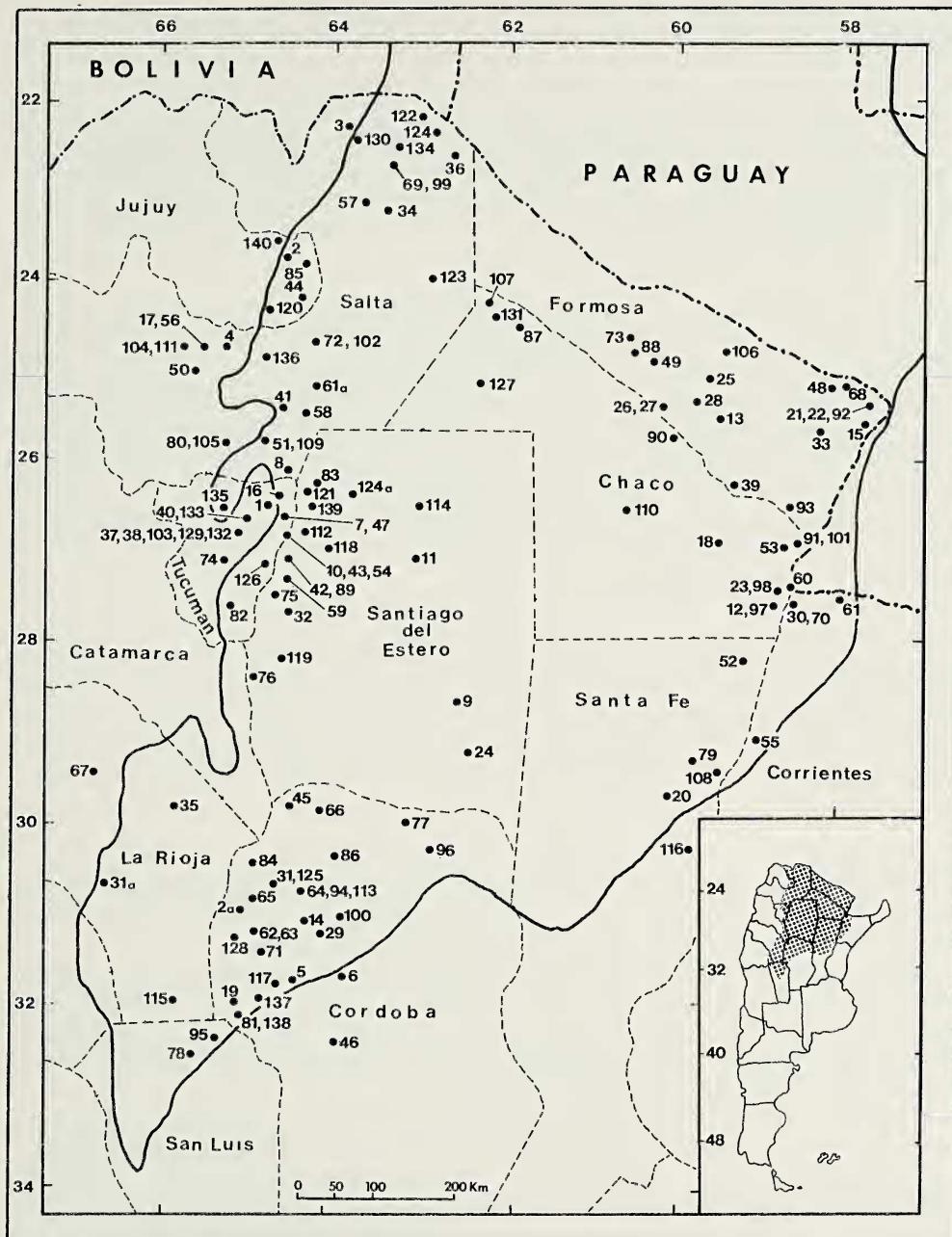


Fig. 1.—Argentine Chaco (solid line) and localities mentioned in the gazetteer of localities. Provinces are delimited by dashed lines and countries by dash and dot lines.

found above 1500 m altitude. The palm *Trithinax campestris* is also a distinctive element of this part of the Chaco.

### The Central Chaco

This is a transitional area sometimes referred to as parkland-savanna (Morello and Adámoli, 1968; Morello and Hortt, 1985), with annual precipitation between 700 and 900 mm. The Central Chaco is a mosaic of trees and grasslands. The dominant trees are *Schinopsis balansae*, *S. quebracho-colorado*, *Aspidosperma quebracho-blanco*, and the aphyllous *Prosopis kuntzei*. Among grasses, the genera *Spartina* and *Elionurus* are dominant.

### The Eastern Chaco

This is the humid extreme of the gradient, with an annual precipitation between 900 and 1200 mm. The landscape is a mosaic of xerophyllous forests intermixed with savannas, swamps, gallery forests, and palms. Dominant trees reach between 22 and 25 m, and are represented by *Schinopsis balansae*, *Aspidosperma quebracho-blanco*, *Astronium balansae*, *Ruprechtia laxiflora*, and *Tabebuia ipe*. Shrubs (*Prosopis*, *Acacia*, *Aloysia*, and *Capparis*) and grasses (*Leptochloa*, *Melica*, and *Paspalum*) are common. Palm-savanna forests occupy large flooded areas and alkaline soils of this eastern subregion. In these forests, the dominant element is the palm *Copernica australis*, with trees and shrubs such as *Prosopis flexuosa*, *Celtis tala*, and *Acacia caven*, as well as epiphytes (*Tillandsia*), also present. In gallery forests, the dominant trees are *Salix humboldtiana* and *Tessaria integrifolia*.

The landscape of the Chaco Austral is dominated mainly by savannas comprising grasses such as *Elionurus muticus*, *Leptochloa choloridiformis*, and *Spartina argentinensis*.

## SPECIES ACCOUNTS

Families and genera are arranged phylogenetically, whereas species are ordered alphabetically within genera. Systematic arrangement of the Family Phyllostomidae follows Baker et al. (1989). Localities reported in the literature and those obtained from museum specimens are given under "Distributional Records." General systematic and ecological information is provided under "Comments."

### Family Noctilionidae

#### *Noctilio albiventris* Desmarest, 1818.

**Distributional records.**—CORRIENTES: Corrientes (ROM); CHACO: Resistencia (Fornes and Massoia, 1968; CML); FORMOSA: Clorinda (Davis, 1976); SANTA FE: Romang, Isla el Laurel (Crespo, 1974; MACN).

**Comments.**—The distribution of this species is not known to include northwestern Argentina. According to Cabrera (1938), specimens of *N. leporinus* from the province of Salta described by Burmeister (1879) should be *N. albiventris*. However, no specimens of *N. albiventris* from northwestern Argentina have been found in the systematic collections studied.

Specimens from El Beni, Bolivia (Myers and Wetzel, 1983), are smaller than those from Resistencia, Chaco ( $n = 1$ ) and Romang, Santa Fé ( $n = 9$ ). Measurements of the Chacoan specimens are similar to those of *N. a. affinis* from the upper Amazon drainage, and not to those of *N. a. cabrerai*, the subspecies to which they should belong according to geographic distribution. Other authors have reported problems identifying specimens to subspecific level (Ibáñez Ulargui, 1981; Myers and Wetzel, 1983), suggesting a more complicated pattern of variation than that proposed by Davis (1976). This species is common in the eastern portion of the Argentine Chaco.

#### *Noctilio leporinus* (Linnaeus, 1758)

**Distributional records.**—CORRIENTES: Corrientes (Davis, 1973); CHACO: Puerto Bermejo (observed); Resistencia (Cabrera, 1938); FORMOSA: Clorinda

(MACN); El Colorado (Massoia, 1970); Estancia Las Mercedes (TCWC); Estanislao del Campo (Davis, 1973); Laguna Blanca (Massoia, 1970); Pozo del Tigre (Davis, 1973); Puerto Pilcomayo (TCWC); JUJUY: Santa Clara (Yepes, 1944); SALTA: Hickman (Villa and Villa, 1971); SANTA FE: Florencia (Cabrera, 1938); SANTIAGO DEL ESTERO: Bañado de Figueroa (CML).

*Comments.*—Although this is a widely distributed species in the Argentine Chaco, it seems to be less abundant in the western part of the region. We have seen several individuals flying over the Río Bermejo in Puerto Bermejo, Chaco Province.

Family Phyllostomidae  
Subfamily Desmodontinae  
*Desmodus rotundus* (Geoffroy, 1810)

*Distributional records.*—CHACO: Colonia Benitez (Villa and Villa, 1971); Río de Oro, General Vedia (FCM); CORDOBA: Aguas de Ramón; Córdoba; Chacra la Merced; El Tuscal; La Argentina; La Bismutina; La Higuera; La Población; La Pochita; Las Chacras; Mina San Ignacio; Niño Dios; Ojo de Agua; Palo Seco; Rayo Cortado, Cerro Colorado; Río Ceballos; Río Hondo, Cruz del Eje; San Isidro; San Juan; Tabaquillo, 15 km E Cruz del Eje (Villa and Villa, 1971); Los Hoyos (MACN); Los Molles (MACN); CORRIENTES: Corrientes (Fornes and Massoia, 1967); Goya (BMNH); FORMOSA: Colonia km 503 (MACN); Departamento Patiño (MACN); Estancia Las Mercedes (MACN); Las Lomitas (MACN); Pozo del Tigre (MACN); LA RIOJA: El Barreal (CML); La Rioja (MACN); SALTA: El Porvenir (ROM); Guemes (MACN); Las Lajitas (MACN); Santa Rosa (CML); Santa Victoria Este (MACN); SANTIAGO DEL ESTERO: Arenales, 15 km E Piedrabuena (TTU); Bañado de Figueroa (CML); Chañar Pozo (Lord et al., 1976); Huyamampa (CML); El Rincón (MACN); La Libertad (MACN); Villa Mercedes (MACN); SAN LUIS: Luján, Quines (Villa and Villa, 1971); TUCUMAN: El Cadillal (CML).

*Comments.*—This species is widely distributed throughout the Chaco, even though records are scarce for some areas.

*Diaemus youngii* (Jentink, 1893)

*Distributional records.*—JUJUY: Agua Salada, 15 km SW Agua Caliente (Barquez, 1984).

*Comments.*—This species was not previously recorded from the Chaco. The locality Agua Salada is near the transitional forests of northwestern Argentina.

Subfamily Vampyrinae  
*Chrotopterus auritus* (Peters, 1856)

*Distributional records.*—CHACO: Colonia Benitez; Río Guaycurú (Cabrera, 1938); FORMOSA: Puerto Velaz (Cabrera, 1938); JUJUY: Palma Sola (ROM); SALTA: Río Mojotoro, 5 km N Salta (Villa and Villa, 1971).

*Comments.*—This is a forest bat, the range of which extends into the northeastern portion of the Argentine Chaco along gallery forests of the main rivers. It also inhabits the Chaco Boreal. However, Chacoan localities in northwestern Argentina are close to the limits of the transitional forests, where the species is more abundant. It has not been reported from the Central Chaco in Argentina.

Reproductive activity was reported for specimens captured in Salta Province in the months of October, November (Barquez, 1987), and the end of July (Villa and Villa, 1969).

Subfamily Phyllostominae  
Tribe Phyllostomini  
*Tonatia bidens* (Spix, 1823)

*Distributional records.*—JUJUY: Palma Sola (Fornes et al., 1967; TCWC; ROM).

*Comments.*—Palma Sola is located close to Chacoan habitat, but is also close to transitional forests, where the only other known locality for this species is in northwestern Argentina (Laguna La Brea, Jujuy Province). The occurrence of *Tonatia bidens* in the Chaco is probably only occasional. Assignment of the Argentine specimens to *T. bidens*, instead of to *T. silvicola*, follows Barquez (1987, 1988).

Myers and Wetzel (1983) reported insect chitin and a large quantity of unidentified whitish pulp in the stomach of a specimen from the Chaco Boreal of Paraguay, but Barquez (1988) captured a specimen with the stomach completely full of down feathers, suggesting carnivory. This specimen was captured in June and was a male with scrotal testes.

Tribe Glossophagini  
*Glossophaga soricina* (Pallas, 1766)

*Distributional records.*—CHACO: Isla del Cerrito (Fornes and Massoia, 1967).

*Comments.*—Isla del Cerrito has vegetation typical of gallery forests. Localities in the Chaco Boreal (Myers and Wetzel, 1983) are associated with mesic zones along the Paraguay River. Podtiaguin's (1944) report of this species from Resistencia, Chaco Province, is not documented clearly.

Tribe Stenodermatini  
*Carollia perspicillata* (Linnaeus, 1758)

*Distributional records.*—CHACO: Puerto Bermejo; Resistencia; FORMOSA: Clorinda (Podtiaguin, 1944).

*Comments.*—The above-mentioned localities are not clearly documented; no other mention of the distribution of this species in the Argentine Chaco exists.

*Sturnira erythromos* (Tschudi, 1844)

*Distributional records.*—SALTA: Rosario de la Frontera (TTU); TUCUMAN: Ticucho, 3 km W (Barquez, 1987).

*Comments.*—This is a common forest bat in northwestern Argentina. The Chacoan localities in Tucumán and Salta provinces are close to Yungas forests. In the middle of June, young specimens were captured at Laguna La Brea, Jujuy, in transitional forest bordering the Western Chaco subregion.

*Sturnira lilium* (Geoffroy, 1810)

*Distributional records.*—CHACO: Resistencia (ROM); FORMOSA: Clorinda (TTU); Estancia Las Mercedes (TTU); Ester de los Patos (TTU); Río Porteño, 5 km S of Estancia Santa Catalina (CML); SALTA: Aguaray (MACN); Metán (BMNH); Tonono, 1 km W (CML); TUCUMAN: Agua Colorada (MACN); El Cadillal (OU).

*Comments.*—In northern Argentina this species is mainly restricted to forests. It is rare in the central Chaco, but can be found in western and eastern portions in gallery forests. Its presence in the Chaco probably is related to fruit availability, as fruits are occasionally rare in the forests during the dry season. In August, the forests of the northwest are relatively dry and fruits are scarce. However, marginal

areas of the Chaco contain gallery forests which have fruits of *Solanum*, which are eaten by this bat. We captured 31 specimens of *S. lilium* in one night of mist netting (1 km W Tonono, Salta Province), while at the same time no specimens were captured at the closest localities, about 20 km away, in the Yungas forests. The occurrence of this species in the Chaco represents only a temporal situation, resulting from limited food resources in their usual habitats.

*Vampyrops lineatus* (Geoffroy, 1810)

*Distributional records.*—CORRIENTES: Laguna Paiva (Barquez, 1987); CHACO: Resistencia (Fornes and Massoia, 1966; CML; MACN).

*Comments.*—The occurrence of this species in the Chaco is documented only from the two above-mentioned localities in Argentina and one in Bolivia (Anderson et al., 1982). Myers and Wetzel (1983) considered this species a common resident of the forests of eastern Paraguay.

*Artibeus fimbriatus* Gray, 1838

*Distributional records.*—CHACO: General Vedia (MACN).

*Comments.*—Because the identity of this species was not clear until the reviews of Myers and Wetzel (1983) and Handley (1989), its distribution is not well documented. Barquez (1987) reported this species in Argentina from three localities, two in the forests of Misiones and a third in the Chaco. This last locality is apparently the only one definitively known in the Chaco. Myers and Wetzel (1979, 1983) reported specimens from eastern Paraguay. Measurements and other diagnostic characters reported for the Paraguayan specimens are concordant with those of the Argentine specimens. In particular, the eye stripes are weakly developed or absent, the rostral shield is moderately to weakly developed, and a third upper molar is present.

*Artibeus lituratus* (Olfers, 1818)

*Distributional records.*—FORMOSA: Bouvier (ROM, not examined).

*Comments.*—The specimen at the ROM is the only known record for this species in the Argentine Chaco. *Artibeus lituratus* is a common species in the forests of Misiones. According to Myers and Wetzel (1983), it is possible that this species may be migratory in the Chaco Boreal; this is not known to occur in Argentina.

*Artibeus planirostris* (Spix, 1823)

*Distributional records.*—TUCUMAN: Río Loro (CML).

*Comments.*—Barquez (1988) proposed the use of this name for specimens from northwestern Argentina that were formerly included in *A. jamaicensis*. The Tucumán locality is in transitional forest surrounded by Chacoan vegetation. Males with scrotal testes were captured during mid-October.

Family Vespertilionidae

*Myotis albescens* (Geoffroy, 1806)

*Distributional records.*—CHACO: Río de Oro, General Vedia (FCM); Río Teuco, 10 km W Tartagal (CML); Pozo del Gato (CML, IADIZA); CORRIENTES: Goya (BMNH); FORMOSA: Estanislao del Campo (TTU); Clorinda (TTU); Colonia km 503 (CML, IADIZA); Colonia km 503, 16 km S (CML, IADIZA); SALTA: Hickman (CML); El Breal, 6 km S Santa Victoria Este (Mares et al., 1981); Salta (La Val, 1973); SANTIAGO DEL ESTERO: Santo Domingo (CML);

TUCUMAN: El Cadillal (CML); Las Talas (OU); Monteagudo (MACN); Ticucho, 3 km W (OU); Tranquitas (MACN).

*Comments.*—The distribution of this species in Argentina is not well known. Several localities were added by Barquez (1987, 1988) and Barquez and Lougheed (1990). We have found large colonies living under the roofs of rural dwellings in Santo Domingo, Santiago del Estero, and in Colonia km 503, Formosa Province. In both places, some individuals of *Eumops patagonicus* were living with the *Myotis*, but the main colonies were separated even under the same roof.

*Myotis keaysi* Allen, 1914

*Distributional records.*—SALTA: Salta (MACN); TUCUMAN: Agua Colorada (MACN); Tranquitas (MACN, TTU).

*Comments.*—According to La Val (1973), the majority of localities known for this species are at altitudes between 2000 and 2400 m, with only a few between 1100 and 1800 in cloud forest. Our records are the first to indicate a Chacoan distribution.

*Myotis levis* (Geoffroy, 1824)

*Distributional records.*—CORDOBA: Córdoba (BMNH, USNM); Embalse de Río Tercero (SSC); Los Hoyos, Sobremonte (MACN); San Esteban (CML, OU); Tala Cañada (MACN); Villa Dolores (TTU); SALTA: Campo Santo (ROM); Guemes (MACN, ROM); Hickman (CML); Horcones (ROM, not examined); TUCUMAN: El Cadillal (CML); Las Talas (CML); Tacanas (CML).

*Comments.*—The subspecies that inhabits the Chaco is *M. l. dinelli* Thomas, 1902.

*Myotis nigricans* (Schinz, 1821)

*Distributional records.*—CHACO: Capitán Solari (OU); Río de Oro (FCM); CORRIENTES: Itatí (BMNH); Laguna Brava (same as Laguna Paiva) (OU); FORMOSA: Bartolomé de las Casas (Massoia, 1976); Bouvier (TTU); Clorinda (MACN); Estanislao del Campo (ROM); Estancia Las Mercedes (TTU); Rio Porteño, 5 km S Estancia Santa Catalina (CML); SALTA: Tonono, 1 km E (CML); Algarrobal, 20 km W Guemes (OU); SANTIAGO DEL ESTERO: Pozo Hondo, Estancia El Guapo (La Val, 1973); Nueva Esperanza (MACN, TCWC, TTU); San Pedro (TTU); TUCUMAN: El Cadillal (CM).

*Comments.*—Chacoan specimens are confused easily with *M. riparius*, a species now considered to be widespread in the Argentine Chaco.

*Myotis riparius* Handley, 1960

*Distributional records.*—CHACO: Taco Pozo, 77 km NE on Rd 20 (CML, IADIZA); FORMOSA: Colonia km 503, 16 km S (CML, IADIZA); SANTIAGO DEL ESTERO: Santo Domingo (CML, IADIZA).

*Comments.*—This species was reported in Argentina only from the northeastern forests of Misiones and Corrientes provinces (Barquez, 1987). Here, we report specimens from throughout the Argentine Chaco, from the provinces of Formosa, Chaco and Santiago del Estero. The specimen from Formosa, a pregnant female carrying a fetus (5 mm C-R), was found under the bark of a quebracho (*Schinopsis* sp.) tree. Specimens from Santiago del Estero were living in colonies of about 50

individuals each under the roof of a rural dwelling. All specimens have a sagittal crest, the second upper molar displaced to the lingual side of the toothrow, and bicolored dorsal fur.

*Myotis simus* Thomas, 1901

*Distributional records.*—FORMOSA: Estancia Las Mercedes (Fornes, 1972).

*Comments.*—This is a rare species. Only two localities have been reported in Argentina, from Formosa and Corrientes provinces (Fornes, 1972). From Paraguay, Myers and Wetzel (1983) reported that females were captured while emerging from a hole in a quebracho tree, which they shared with *Noctilio albiventris*.

*Eptesicus brasiliensis* (Desmarest, 1819)

*Distributional records.*—CHACO: Puente sobre el Río Bermejo (Massoia, 1976); CORRIENTES: Goya (BMNH).

*Comments.*—Most literature records of the occurrence of this species in Argentina correspond to *E. furinalis*, although cited as *E. brasiliensis* (Barquez, 1987). The holotype and other specimens of *E. argentinus* Thomas (1920) at the BMNH show distinctive characters, especially in body size, forearm, length and skull dimensions, which separate that taxon from *E. furinalis*. The large amount of geographic variation in pelage color in *E. furinalis* makes it easily confused with *E. brasiliensis*. We are confident that additional studies will demonstrate that *E. argentinus* is a valid species distinct from both *E. furinalis* and *E. brasiliensis*. For now *E. b. argentinus* is known in Argentina only from the two above-mentioned localities. Davis (1966) and Williams (1978) reviewed the taxonomy of the South American bats of this genus; the latter author offered some characters to differentiate *E. furinalis* from *E. brasiliensis*.

*Eptesicus diminutus* Osgood, 1915

*Distributional records.*—CORRIENTES: Itatí (BMNH); SALTA: Aguaray (MACN); TUCUMAN: El Cadillal (CM).

*Comments.*—Although this species has a wide distribution, Chacoan records are scarce and generally close to the evergreen forests. It is apparently absent in the Chaco Boreal.

*Eptesicus furinalis* (D'Orbigny, 1847)

*Distributional records.*—CHACO: Río Teuco, 10 km W Tartagal (CML); CORRIENTES: Corrientes (Davis, 1966); CORDOBA: Bialet Masse (MACN); Cruz del Eje (BMNH); FORMOSA: Colonia km 503, 16 km S (CML); Estancia Las Mercedes (MACN); Río Porteño, 5 km S Estancia Santa Catalina (CML); JUJUY: Palma Sola (Villa and Villa, 1971); SALTA: Aguaray (MACN); Finca San Lorenzo (MACN); Tonono, 1 km E (CML); SANTIAGO DEL ESTERO: Huyamampa (CML); San Felix (MACN); San Pedro (TTU); TUCUMAN: El Cadillal (CML); Las Talas (OU).

*Comments.*—This species is widely distributed in northern and central Argentina. Barquez (1987) and Barquez and Lougheed (1990) did not recognize the subspecies *E. f. findleyi*, as they considered its putatively diagnostic characters the results of environmental and individual variation. A single specimen from Colonia km 503 was captured under the bark of a tree.

*Histiotus macrotus* (Poeppig, 1835)

*Distributional records.*—SALTA: Río Piedras (BMNH); TUCUMAN: Anta Mapú (MACN); El Cadillal (CML); El Naranjo (MACN, TTU); CORDOBA: Villa Cura Brochero (MACN).

*Comments.*—Barquez and Lougheed (1990) extended the distribution of *H. m. macrotus* to northwestern Argentina, to an area where the chance of contact with *H. m. laephotis* is possible. The above-mentioned localities are for the subspecies *H. m. laephotis*, except for Villa Cura Brochero (Córdoba Province) which represents *H. m. macrotus*.

*Histiotus montanus* (Philippi and Landbeck, 1861)

*Distributional records.*—CORDOBA: Carrizal, Villa Dolores (BMNH); La Cumbre (CML, OU); San Esteban (CML); Punilla, Valle Hermoso (TTU); LA RIOJA: San Isidro (MACN); SANTIAGO DEL ESTERO: Río Saladillo (TTU); San Salvador (FCM).

*Comments.*—Barquez (1987) restricted the distribution of this species in Argentina to the southern portion of the country (27° South). The Chacoan records represent the northernmost distribution of the species.

*Lasiurus borealis* (Muller, 1776)

*Distributional records.*—CHACO: Resistencia (TCWC); CORDOBA: Anisacate (FCM); Bialet Masse (MACN); Cruz del Eje (BMNH); Embalse de Río Tercero (SSC); Río Ceballos (Wainberg and De Rosa, 1966); CORRIENTES: Laguna Paiva (OU); FORMOSA: El Colorado (Massoia, 1970); SALTA: Rosario de la Frontera (TTU); TUCUMAN: Timbó Nuevo (MACN).

*Comments.*—This species is not known from the Central Chaco. Its penetration into the Chaco is more pronounced in the east. Localities from the northwestern part of the Chaco may be derived from the Yungas forests. Specimens from Cruz del Eje were described by Thomas (1902) as *L. borealis salinae*, but Barquez (1987) considered this taxon as a junior synonym of *L. borealis blossevillii*.

*Lasiurus cinereus* (Beauvois, 1769)

*Distributional records.*—CORDOBA: Bailet Masse (Sanborn and Crespo, 1957); CORRIENTES: Corrientes (BMNH, CML); Goya (Sanborn and Crespo, 1957); SALTA: Metán (CML); Joaquín V. Gonzalez, 8 km SE (CML); SANTIAGO DEL ESTERO: Añatuya (Yepes, 1944).

*Comments.*—This species has a wide distribution in Argentina. The above-mentioned localities are the only records known for the Chaco.

*Lasiurus ega* (Gervais, 1856)

*Distributional records.*—CORDOBA: Córdoba (MSB); Río Ceballos (Wainberg and De Rosa, 1966); Río Cuarto (MSB); CORRIENTES: Goya (OU); FORMOSA: Bartolomé de las Casas; El Colorado (Massoia, 1976); Clorinda, 13 km S, on Rd 11 (CML); Río Porteño, 5 km S Estancia Santa Catalina (CML).

*Comments.*—This species is absent in the Central Chaco. In northwestern Argentina it appears to be a forest bat, but is able to enter the Western Chaco from the south. In the northeastern Chaco it occurs in both forest and Chaco habitats.

Barquez and Lougheed (1990) reported this species in Catamarca Province

based upon a locality close to the Monte Desert and the Chaco. At that locality, three females bearing large fetuses were captured in mid-November.

#### Family Molossidae

##### *Cynomops abrasus* (Temminck, 1827)

*Distributional records.*—None for the Argentine Chaco.

*Comments.*—Cabrera (1957) mentioned that the distribution of this species included the provinces of Formosa, Chaco, and Misiones. Yepes (1944) reported it from Colonia Dora, Santiago del Estero. However, no specimens were found in the museums examined by us, with the exception of individuals from Misiones.

##### *Cynomops paranus* (Thomas, 1901)

*Distributional records.*—CORRIENTES: Laguna Paiva (CML).

*Comments.*—The characters of the specimen from Laguna Paiva agree with those offered by Thomas (1901, 1920) for the type specimen at the BMNH. Our specimen was captured in a hole in a tree.

##### *Molossops temminckii* (Burmeister, 1854)

*Distributional records.*—CHACO: Pozo del Gato (CML); Río Teuco, 10 km W Tartagal (CML); CORRIENTES: Goya (BMNH); FORMOSA: Colonia El Pavao, 41 km N Comandante Fontana on Rd 95 (CML); El Colorado (Massoia, 1970); Estanislao del Campo (ROM, not examined); Estero de los Patos (TTU, not examined); Río Porteño, 5 km S Estancia Santa Catalina (CM, CML); JUJUY: Palma Sola (Villa and Villa, 1971); SALTA: Antilla (ROM); Algarrobal (OU); El Breal (CM); Laguna de los Panzones; Retiro (CML); Río del Valle (CML); Rosario de la Frontera (TTU); Santa María (CML); Santa Victoria Este (FCM); SANTA FE: Malabriga (Yepes, 1944); SANTIAGO DEL ESTERO: San Antonio (MACN); San Felix (MACN); Santa Isabel (TTU); El Simbolar (TTU); TUCUMAN: El Cadillal (CML).

*Comments.*—This is one of the most common species in the Chaco. Barquez and Lougheed (1990) reported specimens from Chaco Province that were captured while leaving their refuges in holes in trunks of *Schinopsis quebracho-colorado*, *Bulnesia sarmientoi*, and *Chorisia insignis*. Barquez (1987) could not justify separation of the two subspecies mentioned by Cabrera (1957).

##### *Eumops auripendulus* (Shaw, 1800)

*Distributional records.*—CHACO: Resistencia (MLP).

*Comments.*—This species was formerly known in Argentina only from Misiones Province (Eger, 1977).

##### *Eumops bonariensis* (Peters, 1874)

*Distributional records.*—TUCUMAN: Las Talas (OU).

*Comments.*—Barquez (1987) revalidated specific status for *Eumops patagonicus* Thomas, 1924 (=*E. bonariensis beckeri*). He found that species living in sympatry with *Eumops b. bonariensis* in Tucumán Province. The previously reported occurrences of *E. b. bonariensis* in Argentina included Buenos Aires, Entre Ríos, and Santa Fé provinces. Because of this new record, it can be assumed that this species occurs all across the Chacoan area in Córdoba and Santiago del Estero provinces. Several specimens were captured in Aguas Chiquitas, a locality in

Tucumán Province about 6 km NW of locality 38 (surrounded by the Chaco Serrano).

*Eumops dabbenei* Thomas, 1914

*Distributional records.*—CHACO: Tartagal (BMNH); SANTA FE: Cerrito, La Gallareta (MFA); San Javier (CEM).

*Comments.*—Barquez (1987) restricted the type locality of this species to Tartagal, Chaco Province, based on information contained in the archives of the Museo Argentino de Ciencias Naturales in Buenos Aires whence the type specimen had been sent to the Natural History Museum, London. Later, Barquez and Lougheed (1990) extended the known distribution of the species to Tucumán Province where in mid-December they captured a young specimen with unfused epiphyses. This individual was living in the roof of a house in San Miguel de Tucumán.

*Eumops glaucinus* (Wagner, 1843)

*Distributional records.*—SALTA: Santa Victoria Este (MACN); Tonono, 1 km W (CML); JUJUY: Yuto (CML).

*Comments.*—Myers and Wetzel (1983) found that specimens from the lower Chaco are similar in size and color to those from Santa Cruz, Bolivia. Our locality in Jujuy is in the transitional forest but is very close to the Chaco. Color variation is great in specimens from Argentina. Although a young bat, one individual from San Miguel de Tucumán has darker pelage than specimens from Salta.

*Eumops patagonicus* Thomas, 1924

*Distributional records.*—CHACO: Barranqueras (CML, MACN, TTU); Colonia Benitez (CML); Resistencia (BMNH); Río de Oro, General Vedia (CML); Saenz Peña (Eger, 1977); CORRIENTES: Goya (BMNH); Laguna Paiva (OU); Pozo del Gato (CML); FORMOSA: Bartolomé de las Casas (CML); Bouvier (Eger, 1977); Clorinda (CML); Comandante Fontana (CML); Colonia km 503 (CML); El Colorado (CML, MACN); Laguna Blanca (Massoia, 1970); SALTA: Joaquín V. Gonzalez, 8 km SW, Finca San Javier (CML); Santa Victoria Este (Fornes and Massoia, 1967); Santa Rosa (CML); Tonono, 1 km W (CML); SANTIAGO DEL ESTERO: Bañado de Figueroa (CML); Santa Isabel (Eger, 1977); Las Termas, 5 km W (CML); TUCUMAN: Burruyacú (MACN); Gobernador Piedrabuena (MACN); Las Talas (OU).

*Comments.*—This is a very common species in the Chaco. Barquez (1987) revalidated this taxon and elevated it to full specific status (see comments under *E. bonariensis*).

*Eumops perotis* (Schinz, 1821)

*Distributional records.*—CHACO: General Vedia (ROM); CORDOBA: Córdoba (BMNH); Embalse Río Tercero (SSC); Los Hoyos (Crespo et al., 1961); CORRIENTES: Laguna Paiva (CML, OU); FORMOSA: Clorinda, 13 km S on Rd 11 (CM); Patiño (MACN); Colonia km 503 (CML); SALTA: Campo Santo (ROM); Dragones (Eger, 1977); Salta (MACN); SANTIAGO DEL ESTERO: Bañado de Figueroa (CML); El Retiro (MACN); Nueva Esperanza (MACN); Pozo Hondo, Estancia El Guapo (MACN); Santa Catalina, 5 km W (MACN); Sarapampa (CML).

*Comments.*—This apparently is a species that opportunistically uses man-made houses for shelter. We found a large colony living under the roof of a rural dwelling

in Colonia km 503, Formosa Province. It is common in the Chaco. Even though literature records are scarce, we have seen several high-flying specimens pursuing insects.

*Tadarida brasiliensis* (Geoffroy, 1824)

*Distributional records.* — CORDOBA: Baile Masse (MACN); Carrizal, Villa Dolores (BMNH); La Cumbre (CM); FORMOSA: Río Porteño, 5 km S Estancia Santa Catalina (CML); LA RIOJA: La Rioja (BMNH); SALTA: Metán (MACN); Salta (CML); Santa Victoria Este (MACN); Dragones (Yepes, 1944); Finca La Cruz, 50 km SSW Salta (Villa and Villa, 1971); Río Piedras (BMNH); SANTIAGO DEL ESTERO: Lavalle (MACN); Nueva Esperanza (MACN); TUCUMAN: Burruyacú (MACN); El Cadillal (CML); Estancia El Cavao (CML); Gobernador Piedrabuena (MACN); Las Talas (CML); Tacanas (CML); Tapia (CML); Timbó Nuevo (MACN).

*Comments.* — This is one of the most abundant and widely distributed species in Argentina. However, records for the Chaco are scarce when compared to other phytogeographic provinces. Barquez (1987) reidentified several specimens of *E. patagonicus* reported by Fornes and Massoia (1967) from Barranqueras and Colonia Benítez, Chaco Province, as *Tadarida brasiliensis* (MACN, TTU, FCM). Myers and Wetzel (1983) cited an additional specimen from Barranqueras deposited at ROM which was not examined by us, although specimens collected by Fornes and Massoia have been deposited there.

*Nyctinomops laticaudata* (Geoffroy, 1805)

*Distributional records.* — FORMOSA: Clorinda, 13 km S, on Rd 11 (CML).

*Comments.* — This species is known only from two localities in Argentina (Formosa Province and forests of Salta Province) (Barquez and Ojeda, 1975; Mares et al., 1981).

*Nyctinomops macrotis* (Gray, 1839)

*Distributional records.* — SALTA: Salta (CML); LA RIOJA: Cueva del Chacho (CML); JUJUY: Yuto (CML).

*Comments.* — All of the above-mentioned localities are within the limits of the Chaco, where this species seems to be rare. However, it is common in San Miguel de Tucumán, where it uses buildings for shelter.

*Promops centralis* Thomas, 1915

*Distributional records.* — FORMOSA: Clorinda, 13 km S on Rd 11 (CML); El Colorado (MACN).

*Comments.* — This species is known in Argentina only from Formosa Province, where it seems to be uncommon. A specimen captured at the end of May near Clorinda was a male with scrotal testes. Massoia (1976) reported six specimens which were captured while leaving a palm tree in the backyard of a house in El Colorado.

*Promops nasutus* (Spix, 1823)

*Distributional records.* — SANTIAGO DEL ESTERO: Nueva Esperanza (CML, MACN); Colonia Dora (Yepes, 1944); SALTA: Finca La Cruz (CML); TUCUMAN: Río Loro (OU).

*Comments.* — This species is not typical of the Argentine Chaco. The majority of the known localities for this species are from forest habitats. The locality of

Table 1.—*Species found in the Chaco of Argentina (ARG), Paraguay (PARA) and Bolivia (BOL). An "x" indicates the presence of a species in the country.*

| Species                        | ARG | PARA | BOL |
|--------------------------------|-----|------|-----|
| <b>Emballonuridae</b>          |     |      |     |
| <i>Peropteryx macrotis</i>     | —   | x    | x   |
| <b>Noctilionidae</b>           |     |      |     |
| <i>Noctilio albiventris</i>    | x   | x    | —   |
| <i>Noctilio leporinus</i>      | x   | x    | x   |
| <b>Phyllostomidae</b>          |     |      |     |
| <i>Desmodus rotundus</i>       | x   | x    | —   |
| <i>Diaemus youngii</i>         | x   | —    | —   |
| <i>Chrotopterus auritus</i>    | x   | x    | —   |
| <i>Phyllostomus discolor</i>   | —   | x    | —   |
| <i>Phyllostomus hastatus</i>   | —   | —    | x   |
| <i>Tonatia bidens</i>          | x   | x    | —   |
| <i>Glossophaga soricina</i>    | x   | x    | x   |
| <i>Carollia perspicillata</i>  | x   | x    | x   |
| <i>Sturnira erythromos</i>     | x   | —    | —   |
| <i>Sturnira lilium</i>         | x   | x    | x   |
| <i>Vampyrops dorsalis</i>      | —   | —    | x   |
| <i>Vampyrops lineatus</i>      | x   | —    | x   |
| <i>Artibeus fimbriatus</i>     | x   | —    | —   |
| <i>Artibeus jamaicensis</i>    | —   | x    | —   |
| <i>Artibeus lituratus</i>      | x   | x    | —   |
| <i>Artibeus planirostris</i>   | x   | —    | x   |
| <b>Vespertilionidae</b>        |     |      |     |
| <i>Myotis albescens</i>        | x   | x    | —   |
| <i>Myotis keaysi</i>           | x   | —    | —   |
| <i>Myotis levis</i>            | x   | —    | —   |
| <i>Myotis nigricans</i>        | x   | x    | x   |
| <i>Myotis riparius</i>         | x   | x    | —   |
| <i>Myotis simus</i>            | x   | x    | —   |
| <i>Eptesicus brasiliensis</i>  | x   | —    | —   |
| <i>Eptesicus diminutus</i>     | x   | —    | —   |
| <i>Eptesicus furinalis</i>     | x   | x    | —   |
| <i>Histiotus macrotus</i>      | x   | —    | —   |
| <i>Histiotus montanus</i>      | x   | —    | —   |
| <i>Lasiorurus borealis</i>     | x   | x    | —   |
| <i>Lasiorurus cinereus</i>     | x   | x    | —   |
| <i>Lasiorurus ega</i>          | x   | x    | —   |
| <b>Molossidae</b>              |     |      |     |
| <i>Cynomops abrasus</i>        | —   | x    | —   |
| <i>Cynomops paranus</i>        | x   | —    | —   |
| <i>Cynomops planirostris</i>   | —   | x    | —   |
| <i>Molossops temminckii</i>    | x   | x    | —   |
| <i>Eumops auripendulus</i>     | x   | x    | —   |
| <i>Eumops bonariensis</i>      | x   | —    | —   |
| <i>Eumops dabbenei</i>         | x   | x    | —   |
| <i>Eumops glaucinus</i>        | x   | x    | —   |
| <i>Eumops patagonicus</i>      | x   | x    | —   |
| <i>Eumops perotis</i>          | x   | x    | —   |
| <i>Tadarida brasiliensis</i>   | x   | —    | —   |
| <i>Nyctinomops laticaudata</i> | x   | x    | —   |
| <i>Nyctinomops macrotis</i>    | x   | x    | —   |
| <i>Promops centralis</i>       | x   | x    | —   |

Table 1.—Continued.

| Species                  | ARG | PARA | BOL |
|--------------------------|-----|------|-----|
| <i>Promops nasutus</i>   | X   | X    | —   |
| <i>Molossus ater</i>     | X   | X    | —   |
| <i>Molossus molossus</i> | X   | X    | —   |
| Total                    |     |      |     |
| 50 species               | 43  | 34   | 10  |
| Percent of total         | 86% | 68%  | 20% |

Cachi (Salta Province), reported by Myers and Wetzel (1983) as being in the Chaco, is in fact in the Monte Desert. Specimens taken at the end of June at Río Loro, Tucumán Province, had scrotal testes. One female collected at Nueva Esperanza (Santiago del Estero Province) was pregnant at the end of October.

#### *Molossus ater* Geoffroy, 1805

*Distributional records.*—CORDOBA: Alta Gracia (Fornes and Massoia, 1967); CHACO: Colonia Benitez (FCM); General Vedia (FCM, MACN); Resistencia (CML); FORMOSA: Bartolomé de las Casas (CML); Bouvier (OU); Clorinda, 13 km S on Rd 11 (CML); El Colorado (MACN); Laguna Blanca (Massoia, 1970); SALTA: Salta (Villa and Villa, 1971).

*Comments.*—The subspecific status of the Argentine populations of this species is not clear. Barquez (1987) examined specimens (AMNH) from El Beni, Bolivia, assigned to *M. a. ater*. These are comparable to those from Chaco, Corrientes, and Formosa provinces in Argentina. He also found that intrapopulational variation is high, based on observations of a large number of specimens captured at Laguna Paiva, Corrientes Province. It is possible that all specimens from Argentina belong to the same subspecies, but this question has to be resolved in the future.

#### *Molossus molossus* (Pallas, 1766)

*Distributional records.*—CHACO: Pozo del Gato (CML); Resistencia, 20 km N; CORRIENTES: Goya (BMNH, USNM); Laguna Paiva (CML); FORMOSA: Bartolomé de las Casas (Massoia, 1970); El Colorado (MACN); Laguna Blanca (Massoia, 1970); Río Porteño, 5 km S Estancia Santa Catalina (CML); SALTA: Salta (MACN); Santa Rosa (CML); Santa Victoria Este (MACN, TTU); SAN-TIAGO DEL ESTERO: Nueva Esperanza (MACN, TTU); Santo Domingo (CML).

*Comments.*—This is a common Chacoan bat which uses man-made structures for shelter. A single male from Río Porteño (Formosa Province) had scrotal testes in mid-May, and a female from El Colorado (Formosa Province) was pregnant in mid-January. Myers and Wetzel (1983) also found pregnant females during September and November in the Chaco Boreal.

#### DISCUSSION

More than a quarter of the South American bat fauna occurs in the "Gran Chaco" biogeographic province. Thus, of the 187 species (Koopman, 1982), about 50 (Myers and Wetzel, 1983) are present in the Chacoan thorn-scrub savanna. The bat fauna of the Argentine Chaco includes 43 species (Table 1).

Within Argentina, the western and eastern portions of the Chaco have the largest numbers of species. Thirty-one species are present in each portion, whereas in

Table 2.—Checklist of the bats of the Chaco of Argentina. The status of each species is indicated as being: A (abundant), C (common), U (uncommon), and R (rare). Guild abbreviations: PISCI (piscivore), FRUGI (frugivore), CARNI (carnivore), SANGUI (sanguivore), NECTAR (nectarivore), FOGLOM (foliage gleaner omnivore), and AERIN (aereal insectivore).

| Species                        | Major Chaco subregions |         |         | Guilds |
|--------------------------------|------------------------|---------|---------|--------|
|                                | Western                | Central | Eastern |        |
| <b>Noctilionidae</b>           |                        |         |         |        |
| <i>Noctilio albiventris</i>    | —                      | —       | C       | PISCI  |
| <i>Noctilio leporinus</i>      | U                      | C       | C       | PISCI  |
| <b>Phyllostomidae</b>          |                        |         |         |        |
| <i>Desmodus rotundus</i>       | A                      | A       | A       | SANGUI |
| <i>Diaemus youngii</i>         | R                      | —       | —       | SANGUI |
| <i>Chrotopterus auritus</i>    | C                      | —       | C       | CARNI  |
| <i>Tonatia bidens</i>          | R                      | —       | —       | FOGLOM |
| <i>Glossophaga soricina</i>    | —                      | —       | R       | NECTAR |
| <i>Carollia perspicillata</i>  | —                      | —       | R       | FRUGI  |
| <i>Sturnira erythromos</i>     | C                      | —       | —       | FRUGI  |
| <i>Sturnira lilium</i>         | A                      | R       | A       | FRUGI  |
| <i>Vampyrops lineatus</i>      | —                      | —       | R       | FRUGI  |
| <i>Artibeus fimbriatus</i>     | —                      | —       | U/R     | FRUGI  |
| <i>Artibeus lituratus</i>      | —                      | —       | U       | FRUGI  |
| <i>Artibeus planirostris</i>   | C                      | —       | —       | FRUGI  |
| <b>Vespertilionidae</b>        |                        |         |         |        |
| <i>Myotis albescens</i>        | A                      | A       | A       | AERIN  |
| <i>Myotis keaysi</i>           | R                      | —       | —       | AERIN  |
| <i>Myotis levis</i>            | A                      | —       | —       | AERIN  |
| <i>Myotis nigricans</i>        | C                      | C       | C       | AERIN  |
| <i>Myotis riparius</i>         | U                      | C       | C       | AERIN  |
| <i>Myotis simus</i>            | —                      | —       | R       | AERIN  |
| <i>Eptesicus brasiliensis</i>  | —                      | —       | R       | AERIN  |
| <i>Eptesicus diminutus</i>     | R                      | —       | R       | AERIN  |
| <i>Eptesicus furinalis</i>     | C                      | C       | C       | AERIN  |
| <i>Histiotus macrotus</i>      | C                      | —       | —       | AERIN  |
| <i>Histiotus montanus</i>      | C                      | —       | —       | AERIN  |
| <i>Lasiurus borealis</i>       | C                      | —       | C       | AERIN  |
| <i>Lasiurus cinereus</i>       | C                      | —       | C       | AERIN  |
| <i>Lasiurus ega</i>            | C                      | —       | C       | AERIN  |
| <b>Molossidae</b>              |                        |         |         |        |
| <i>Cynomops paranus</i>        | —                      | —       | R       | AERIN  |
| <i>Molossops temminckii</i>    | A                      | A       | A       | AERIN  |
| <i>Eumops auripendulus</i>     | —                      | —       | R       | AERIN  |
| <i>Eumops bonariensis</i>      | U                      | —       | —       | AERIN  |
| <i>Eumops dabbenei</i>         | R                      | R       | R       | AERIN  |
| <i>Eumops glaucinus</i>        | U                      | —       | —       | AERIN  |
| <i>Eumops patagonicus</i>      | A                      | A       | A       | AERIN  |
| <i>Eumops perotis</i>          | C                      | C       | C       | AERIN  |
| <i>Tadarida brasiliensis</i>   | A                      | A       | A       | AERIN  |
| <i>Nyctinomops laticaudata</i> | —                      | —       | R       | AERIN  |
| <i>Nyctinomops macrotis</i>    | R                      | —       | —       | AERIN  |
| <i>Promops centralis</i>       | —                      | —       | U       | AERIN  |
| <i>Promops nasutus</i>         | U                      | U       | —       | AERIN  |
| <i>Molossus ater</i>           | R                      | —       | C       | AERIN  |
| <i>Molossus molossus</i>       | A                      | A       | A       | AERIN  |
| Total                          |                        |         |         |        |
| 43                             | 31                     | 14      | 31      |        |
| Percent of total               | 72%                    | 32.5%   | 72%     |        |

Table 3.—Exclusive species for each of the subregions of the Argentine Chaco. Those indicated with a "+" inhabit the eastern part of Argentina but were not captured in the eastern Chaco. Those indicated with an "\*" inhabit the western part of Argentina but were not captured in the western Chaco.

| Western                      | Eastern                          |
|------------------------------|----------------------------------|
| <i>Tonatia bidens</i>        | <i>Noctilio albiventris</i>      |
| <i>Sturnira erythromos</i>   | * <i>Glossophaga soricina</i>    |
| <i>Artibeus planirostris</i> | <i>Carollia perspicillata</i>    |
| + <i>Diaemus youngii</i>     | <i>Vampyrops lineatus</i>        |
| <i>Myotis keaysi</i>         | <i>Artibeus fimbriatus</i>       |
| <i>Myotis levis</i>          | <i>Artibeus lituratus</i>        |
| <i>Histiotus macrotus</i>    | <i>Myotis simus</i>              |
| <i>Histiotus montanus</i>    | <i>Eptesicus brasiliensis</i>    |
| <i>Eumops bonariensis</i>    | <i>Cynomops paranus</i>          |
| <i>Eumops glaucinus</i>      | <i>Eumops auripendulus</i>       |
| <i>Nyctinomops macrotis</i>  | * <i>Nyctinomops laticaudata</i> |
|                              | <i>Promops centralis</i>         |

the central subregion about 14 species occur (Table 2). This difference in richness likely is related to the contact of the Chaco with the humid and transitional habitats that occur adjacent to the western and eastern subregions, and the contributions of these habitats to the bat assemblages of those subregions. Thus, 11 species are restricted to the western subregion which is in close proximity with the subtropical "Yungas" forests. Twelve species occur exclusively in the eastern subregion, near the southern limits of the Atlantic rainforests and gallery forests (Table 3).

The Chaco Austral is far from being depauperate from the standpoint of bats. Approximately 80% of the species found in Argentina occur in the Chacoan Phytogeographic Province (Barquez, 1987). A comparison of its biogeographic affinities with the xerophyllous Cerrado and Caatinga formations shows that at least 24 species (56%) are shared with the Caatingas of northeast Brazil (Mares et al., 1981; Myers and Wetzel, 1983; Willig, 1983). The preliminary nature of data on the bats of the Cerrado (Mares et al., 1989) precludes comparison with that formation.

Are any bats endemic to the Chacoan thorn-scrub savanna? The traditional answer to this question has been no (see Myers and Wetzel, 1983). No species are phylogenetically distinct from populations in other areas. On the other hand, considering the rarity or commonness of a species (relative abundance), we find a group of species whose optimum abundance seems to correspond well with this semiarid region. The central portion of the Chaco reflects the optimum occurrence for 11 species ("core species," Fleming, 1986) which can be rated as common or abundant (Table 2).

Among seven feeding guilds (Table 2), the highest percentage of species are insectivores (67%). The frugivorous guild includes 16% of the species. The remaining species are distributed among sanguivores, piscivores, nectarivores, omnivores, and a carnivore. Eleven of the 14 species (78%) in the Central Subregion constitute "core species" in terms of abundance or commonness (Fleming, 1986). The insectivore guild is well represented in the Central Subregion, where 82% of the insectivores are "core species." In the western and eastern subregions, the distribution of species in feeding guilds is more homogeneous and the percentage of the insectivorous "core species" drops to 61% and 62%, respectively.

In spite of different analytical methods, the results from the Chaco contrast with the feeding guild occupation of bats of the Caatingas and edaphic Cerrado.

The edaphic Cerrado bat community is dominated by frugivores and foliage gleaners, whereas the Caatingas bat community has a more even distribution of species within the guilds (Willig, 1983, 1986).

How well do the assemblages of Chacoan bats divide their resources? In contrast with other feeding guilds (i.e., frugivores), the insectivores show a high degree of overlap in ecomorphological traits. This poses a problem when trying to imply ecological processes (i.e., different foraging strategies) in determining the organization of the community (Willig, 1986). The abundance and commonness of the insectivore guild in the Chacoan bat assemblage poses an interesting problem with regard to community structure. Although there is a paucity of research dealing with the structure of and resource partitioning in mammalian assemblages in the Chaco, circumstantial evidence suggests that diversity and abundance of the arthropod resource base may be key factors (Bucher, 1974, 1980; Ojeda and Mares, 1989). Additional studies at the level of local assemblages, of migrations, and on temporal and spatial fluctuations in diversity and abundance of resources may provide answers to this complex question.

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## APPENDIX 1

### *Gazetteer of Localities*

(numbers refer to numbered localities on Fig. 1)

1. Agua Colorada (Tucumán, Burruyacú)
2. Agua Salada, 15 km SW of Agua Caliente (Jujuy, Santa Barbara) 23°57'S, 64°38'W
- 2a. Aguas de Ramón (Córdoba, Minas) 30°48'S, 65°22'W
3. Aguaray (Salta, San Martín) 22°16'S, 63°46'W
4. Algarrobal, 20 km W of Guemes (Salta, Anta) 25°24'S, 64°02'W
5. Alta Gracia (Córdoba, Santa María) 31°40'S, 64°26'W
6. Anizacate (Córdoba, Santa María) 31°34'S, 64°26'W
7. Anta Mapú (Tucumán, Burruyacú) 26°31'S, 64°25'W
8. Antilla (Salta, Rosario de la Frontera) 26°07'S, 64°36'W
9. Añatuya (Santiago del Estero, General Taboada) 28°27'S, 62°50'W
10. Arenales, 15 km E of Piedrabuena (Santiago del Estero, Jiménez) 26°43'S, 64°35'W
11. Bañado de Figueiroa (Santiago del Estero, Figueiroa) 27°31'S, 63°35'W
12. Barranqueras (Chaco, San Fernando) 27°29'S, 58°56'W
13. Bartolomé de las Casas (Formosa, Patiño) 25°25'S, 59°35'W
14. Baile Massé (Córdoba, Punilla) 31°18'S, 64°28'W
15. Bouvier (Formosa, Pilcomayo) 25°27'S, 57°35'W
16. Burruyacú (Tucumán, Burruyacú) 26°30'S, 64°45'W
17. Campo Santo (Salta, General Guemes) 24°42'S, 65°06'W
18. Capitán Solari, La Forestal (Chaco, Sargent Cabral) 26°48'S, 59°34'W
19. Carrizal, Villa Dolores, 1000 m (Córdoba, San Javier) 32°05'S, 65°02'W

20. Cerrito, La Gallareta (Santa Fé, Vera) 29°30'S, 60°30'W
21. Clorinda (Formosa, Pilcomayo) 25°17'S, 57°43'W
22. Clorinda, 13 km S on Rd 11 (Formosa, Pilcomayo) 25°23'S, 57°45'W
23. Colonia Benitez (Chaco, Primero de Mayo) 27°20'S, 58°57'W
24. Colonia Dora (Santiago del Estero, Avellaneda) 28°37'S, 62°57'W
25. Colonia El Pavao, 41 km N Comandante Fontana on Rd 95 (Formosa, Patiño) 59°50'S, 25°00'W
26. Colonia km 503 (Formosa, Patiño) 25°23'S, 60°19'W
27. Colonia km 503, 16 km S (Formosa, Patiño)
28. Comandante Fontana (Formosa, Patiño) 25°20'S, 59°41'W
29. Córdoba (Córdoba, Capital) 31°25'S, 64°12'W
30. Corrientes (Corrientes, Capital) 27°28'S, 58°50'W
31. Cruz del Eje (Córdoba, Cruz del Eje) 30°44'S, 74°49'W
- 31a. Cueva del Chaco (La Rioja, Patquia) 30°02'S, 66°50'W
32. Chafiar Pozo (Santiago del Estero, Río Hondo) 27°19'S, 64°40'W
33. Departamento Patiño (Formosa)
34. Dragones (Salta, San Martín) 23°16'S, 63°21'W
35. El Barreal (La Rioja, Capital) 29°38'S, 66°06'W
36. El Breal, 6 km S of Santa Victoria Este (Salta, Rivadavia) 23°14'S, 62°56'W
37. El Cadillal (Tucumán, Capital) 26°37'S, 65°12'W
38. El Cadillal, Usina (Tucumán, Capital) 26°37'S, 65°12'W
39. El Colorado (Formosa, Pirané) 26°18'S, 59°22'W
40. El Naranjo (Tucumán, Burruyacú) 26°41'S, 65°03'W
41. El Porvenir (Salta, Metán) 25°23'S, 64°40'W
42. El Retiro (Santiago del Estero, Figueroa) 27°04'S, 64°28'W
43. El Rincón (Santiago del Estero, Jimenez) 26°43'S, 64°50'W
44. El Simbolar, 25 km SW of Palma Sola (Jujuy, Santa Bárbara) 24°11'S, 64°28'W
45. El Tuscal (Córdoba, Tulumba) 29°40'S, 64°31'W
46. Embalse de Río Tercero (Córdoba, Calamuchita) 32°11'S, 64°27'W
47. Estancia El Cavao (Tucumán, Burruyacú) 26°30'S, 64°45'W
48. Estancia Las Mercedes (Formosa, Pilcomayo) 25°11'S, 47°54'W
49. Estanislao del Campo (Formosa, Patiño) 25°03'S, 60°06'W
50. Finca La Cruz, 50 km SSW of Salta (Salta, La Capital) 24°54'S, 64°10'W
51. Finca San Lorenzo (Salta, Rosario de la Frontera) 25°48'S, 64°58'W
52. Florencia (Santa Fé, General Obligado) 28°02'S, 59°14'W
53. General Vedia (Chaco, Bermejo) 26°56'S, 58°41'W
54. Gobernador Piedrabuena (Tucumán, Burruyacú) 26°45'S, 64°39'W
55. Goya (Corrientes, Goya) 29°08'S, 59°17'W
56. Guemes (Salta, General Guemes) 24°41'S, 65°02'W
57. Hickman (Salta, San Martín) 23°13'S, 63°34'W
58. Horcones (Salta, Rosario de la Frontera) 25°48'S, 64°55'W
59. Huyamampa (Santiago del Estero, Banda) 27°23'S, 64°18'W
60. Isla del Cerrito (Chaco, Bermejo) 27°16'S, 58°41'W
61. Itatí (Corrientes, Itatí) 27°16'S, 58°15'W
- 61a. Joaquín V. Gonzalez, 8 km SE, Finca San Javier (Salta, Anta) 25°02'S, 64°05'W
62. La Argentina (Córdoba, Minas) 31°14'S, 65°18'W
63. La Bismutina (Córdoba, Minas) 31°09'S, 65°13'W
64. La Cumbre (Córdoba, Punilla) 30°59'S, 64°30'W
65. La Higuera (Córdoba, Cruz del Eje) 31°01'S, 65°06'W
66. La Pochita (Córdoba, Sobremonte) 29°46'S, 64°49'W
67. La Rioja (La Rioja, Capital) 29°25'S, 66°51'W
68. Laguna Blanca (Formosa, Pilcomayo) 25°08'S, 58°15'W
69. Laguna de los Panzones (Salta, Rivadavia) 22°54'S, 63°27'W
70. Laguna Paiva (Corrientes, Capital) 27°30'S, 58°45'W
71. Las Chacras (Córdoba, Pocho) 31°30'S, 65°28'W
72. Las Lajitas (Salta, Anta) 24°41'S, 64°15'W
73. Las Lomitas (Formosa, Patiño) 24°43'S, 60°36'W
74. Las Talas (Tucumán, Famaillá) 27°00'S, 65°17'W
75. Las Termas, 5 km W (Santiago del Estero, Río Hondo) 27°30'S, 64°50'W
76. Lavalle (Santiago del Estero, Guasayán) 28°12'S, 65°07'W
77. Los Hoyos (Córdoba, Río Seco) 29°49'S, 63°39'W
78. Luján (San Luis, Ayacucho) 32°22'S, 65°56'W

79. Malabriga (Santa Fé, General Obligado) 29°20'S, 59°59'W
80. Metán (Salta, Metán) 25°30'S, 64°58'W
81. Mina San Ignacio (Córdoba, San Alberto) 31°58'S, 65°33'W
82. Monteagudo (Tucumán, Chicligasta) 27°31'S, 65°16'W
83. Nueva Esperanza (Santiago del Estero, Pellegrini) 26°12'S, 64°16'W
84. Ojo de Agua (Córdoba, Minas) 31°14'S, 65°12'W
85. Palma Sola (Jujuy, Santa Bárbara) 24°00'S, 64°19'W
86. Palo Seco (Córdoba, Tulumba) 30°08'S, 65°20'W
87. Pozo del Gato (Chaco, General Guemes) 61°58'S, 24°40'W
88. Pozo del Tigre (Formosa, Patiño) 24°54'S, 60°19'W
89. Pozo Hondo, Estancia El Guapo (Santiago del Estero, Jimenez) 27°10'S, 64°30'W
90. Puente sobre el Río Bermejo (Chaco, San Martín) 26°20'S, 59°22'W
91. Puerto Bermejo (Chaco, Bermejo) 26°56'S, 58°30'W
92. Puerto Pilcomayo (Formosa, Pilcomayo) 25°22'S, 57°39'W
93. Puerto Velaz (Formosa, Laishi) 26°40'S, 58°32'W
94. Punilla, Valle Hermoso (Córdoba, Punilla) 31°07'S, 64°30'W
95. Quines, Luján (San Luis, Ayacucho) 32°14'S, 65°48'W
96. Rayo Cortado, Cerro Colorado (Córdoba, Río Seco) 30°04'S, 63°50'W
97. Resistencia (Chaco, San Fernando) 27°27'S, 59°00'W
98. Resistencia, 20 km N (Chaco, Primero de Mayo) 27°16'S, 58°58'W
99. Retiro (Salta, Rivadavia) 22°54'S, 63°27'W
100. Río Ceballos (Córdoba, Colón) 31°11'S, 64°20'W
101. Río de Oro, General Vedia (Chaco, Bermejo) 26°56'S, 58°41'W
102. Río del Valle (Salta, Anta) 24°38'S, 64°16'W
103. Río Loro (Tucumán, Burruyacú) 26°37'S, 65°10'W
104. Río Mojotoro, 5 km N of Salta (Salta, Capital) 24°43'S, 65°17'W
105. Río Piedras (Salta, Metán) 25°18'S, 64°55'W
106. Río Porteño, 5 km S Estancia Santa Catalina (Formosa, Patiño) 24°56'S, 59°12'W
107. Río Teuco, 10 km W of Tartagal (Chaco, General Guemes) 62°00'S, 24°20'W
108. Romang, Isla el Laurel (Santa Fé, San Javier) 29°30'S, 50°46'W
109. Rosario de la Frontera (Salta, Rosario de la Frontera) 25°48'S, 64°58'W
110. Saenz Peña (Chaco, Comandante Fernandez) 26°47'S, 60°27'W
111. Salta (Salta, La Capital) 24°47'S, 65°24'W
112. San Antonio (Santiago del Estero, Jimenez) 26°46'S, 64°36'W
113. San Esteban, 1100 m (Córdoba, Punilla) 30°55'S, 64°32'W
114. San Felix (Santiago del Estero, Alberdi) 26°38'S, 63°24'W
115. San Isidro (La Rioja, General San Martín) 31°46'S, 66°25'W
116. San Javier (Santa Fé, San Javier) 30°35'S, 59°56'W
117. San Juan (Córdoba, San Alberto) 31°37'S, 65°22'W
118. San Pedro (Santiago del Estero, Jimenez) 27°06'S, 64°27'W
119. Santa Catalina, 5 km W (Santiago del Estero, Guasayán) 28°08'S, 64°47'W
120. Santa Clara (Jujuy, Santa Bárbara) 24°18'S, 74°41'W
121. Santa Isabel (Santiago del Estero, Pellegrini) 26°20'S, 64°20'W
122. Santa María (Salta, Rivadavia) 22°07'S, 62°50'W
123. Santa Rosa (Salta, Rivadavia) 63°20'S, 23°50'W
124. Santa Victoria Este (Salta, Rivadavia) 22°17'S, 62°43'W
- 124a. Santo Domingo (Santiago del Estero) 26°10'S, 63°48'W
125. Tabaquillo, 15 km E of Cruz del Eje (Córdoba, Cruz del Eje) 30°47'S, 64°57'W
126. Tacanas (Tucumán, Leales) 27°08'S, 64°49'W
127. Taco Pozo, 77 km NE on Rd 20 (Chaco) 62°10'S, 25°12'W
128. Tala Cañada, 1250 m (Córdoba, Pocho) 31°21'S, 64°58'W
129. Tapia (Tucumán, Trancas) 26°36'S, 65°17'W
130. Tartagal (Salta, San Martín) 22°32'S, 63°49'W
131. Tartagal (Chaco, General Guemes) 24°11'S, 62°07'W
132. Ticucho, 3 km W (Tucumán, Trancas) 26°31'S, 65°13'W
133. Timbó Nuevo (Tucumán, Burruyacú) 26°43'S, 65°07'W
134. Tonono, 1 km W (Salta) 27°17'S, 63°30'W
135. Tranquitas (Tucumán, Burruyacú) 26°37'S, 65°02'W
136. Unchimé (Salta, Guemes) 24°50'S, 64°24'W
137. Villa Cura Brochero (Córdoba, San Alberto) 31°42'S, 65°01'W
138. Villa Dolores (Córdoba, San Javier) 31°57'S, 65°12'W

139. Villa Mercedes (Santiago del Estero, Pellegrini) 26°29'S, 62°12'W

140. Yuto (Jujuy, Ledesma) 23°38'S, 64°28'W

Localities not located: Estero de los Patos, Formosa. Chacra La Merced, Córdoba. La Libertad, Santiago del Estero. La Población, Córdoba. Los Hoyos, Departamento Sobremonte, Córdoba. Los Molles, Departamento Cruz del Eje, Córdoba. Niño Dios, Córdoba. Río Guaycurú, Chaco. Río Hondo, Departamento Cruz del Eje, Córdoba.